MU967701A
Clock Recovery Unit
Operation Manual

First Edition

Read this manual before using the equipment.
Keep this manual with the equipment.

Measuring Instruments Division
Measurement Group
ANRITSU CORPORATION

Document No.: M-W1710AE-1.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Insure that you clearly understand the meanings of the symbols BEFORE using the equipment.
Some or all of the following five symbols may not be used on all Anritsu equipment. In addition, there may be other labels attached to products which are not shown in the diagrams in this manual.

Symbols used in manual

DANGER ⚠ This indicates a very dangerous procedure that could result in death or serious injury if not performed properly.

WARNING ⚠ This indicates a hazardous procedure that could result in death or serious injury if not performed properly.

CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Insure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.

This indicates warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

MU967701A
Clock Recovery Unit
Operation Manual

14 January 2000 (First Edition)

Copyright © 2000, ANRITSU CORPORATION.
All rights reserved. No part of this manual may be reproduced without the prior written permission of the publisher.
The contents of this manual may be changed without prior notice.
Printed in Japan

For Safety

WARNING ⚠

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.
   Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Repair

WARNING ⚠

2. This equipment cannot be repaired by the user. DO NOT attempt to open the cabinet or to disassemble internal parts. Only Anritsu-trained service personnel or staff from your sales representative with a knowledge of electrical fire and shock hazards should service this equipment.
   There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision parts.

CAUTION ⚠

Check Terminal

3. NEVER input a signal of more than indicated value between the measured terminal and ground. Input of an excessive signal may damage the equipment.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories including the Electrotechnical Laboratory, the National Research Laboratory of Metrology and the Communications Research Laboratory, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within 1 year after shipment due to a manufacturing fault, provided that this warranty is rendered void under any or all of the following conditions.

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding, earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

If this equipment develops a fault, contact Anritsu Corporation or its representatives at the address in this manual.

Notes on Export Management

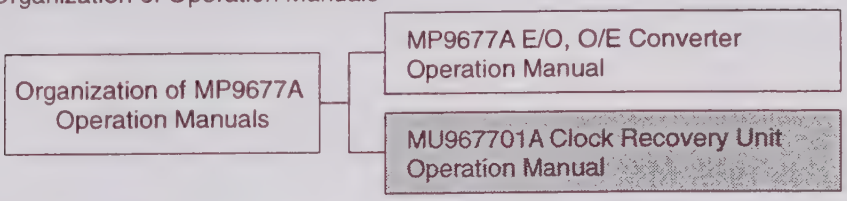
This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.
Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

Disposal

The unit uses gallium arsenide. Dispose the unit with care by complying with applicable national laws and local regulations.

About This Manual

Organization of Operation Manuals


Organization of MP9677A Operation Manuals
MP9677A E/O, O/E Converter Operation Manual
MU967701A Clock Recovery Unit Operation Manual

- MP9677A E/O, O/E Converter Operation Manual
  This manual explains the outline, preparation before use, panel description, specifications, performance and operation of MP9677A.

- MU967701A Clock Recovery Unit Operation Manual
  This manual explains the outline, preparation before use, panel description, specifications, performance and operation of MU967701A Clock Recovery Unit.

Section organization of this manual

Section	Description
Section 1 Outline	Explains the product outline, configurations, and specifications.
Section 2 Panels Descriptions	Explains the functions on the panel including the connectors on the panel.
Section 3 Operating Principle	Explains the operating principle of this unit.
Section 4 Operation Instructions	Explains the operation instructions of the unit
Section 5 Performance Test	Explains the performance test procedure for the electrical characteristics.
Section 6 Maintenance and Disposal	Explains information on the storage environment, transportation, and disposal.
Appendix	The performance test result record sheet is attached.

Table of Contents

For Safety iii

About This Manual I

Section 1 Outline 1-1

1.1 Product Outline 1-2
1.2 Configuration 1-2
1.3 Specifications 1-3

Section 2 Panels Descriptions 2-1

2.1 Panel Description 2-2

Section 3 Operating Principle 3-1

3.1 Operating Principle 3-2

Section 4 Operation Instructions 4-1

4.1 Operation Instructions 4-2

Section 5 Performance Test 5-1

5.1 Outline 5-2
5.2 I/O Characteristics 5-3
5.3 Intrinsic Jitter 5-4
5.4 Jitter Tolerance 5-5
5.5 Jitter Transfer 5-6

Section 6 Maintenance and Disposal 6-1

6.1 Daily Maintenance 6-2
6.2 Cautions Regarding Storage 6-2
6.3 Transportation 6-3
6.4 Calibration 6-3
6.5 Disposal 6-3

Appendix Performance Test Result Record Sheet..... Appendix-1

Section 1 Outline

This section explains the outline and specifications.

1.1 Product Outline 1-2
1.2 Configuration 1-2
1.2.1 Standard Configuration 1-2
1.3 Specifications 1-3

Product Outline

MU967701A Clock Recovery Unit (referred to as the unit hereinafter) is a plug-in unit to be inserted into MP9677A E/O, O/E Converter. The unit reproduces 9.95328 GHz clock from 9.95328 Gbit/s NRZ signal.

The jitter bandwidth of the reproduced clock can be selected either from Wide (80 MHz) or Narrow (8 MHz). The jitter bandwidth is 80 MHz at Bandwidth: Wide. The 9.93528 Gbit/s jitter can be measured by combining this with MP1777A 10 GHz Jitter Analyzer.

1.2 Configuration

1.2.1 Standard Configuration

Table 1-1 lists the MU967701A standard unit configuration

Table 1-1 Standard Configuration

Item	Model/No.	Description	Qty.	Remarks
Main	MU967701A	Clock Recovery Unit	1	
Access-	J0994	50Ω terminating set	1	
ories	W1710AE	Operation Manual	1	

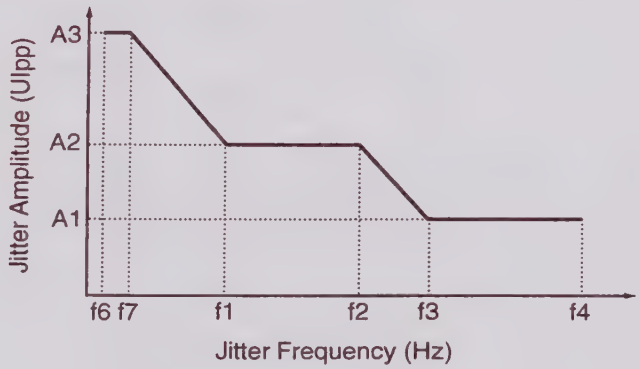
1.3 Specifications

The specifications of this unit is described in the Table 1-2 specifications.

Table 1-2 Specifications (1/3)

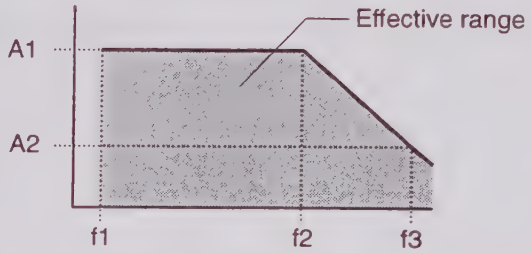
Item	Specifications
Data input	Reshaped Data Input
Bit rate	9.95328 Gbit/s ±50 ppm
Input level	0.5 to 1.5 Vp-p
Input signal format	NRZ
Impedance	50Ω
Connector	SMA
Data output	Though Data Output
Bit rate	9.95328 Gbit/s ±50 ppm (By input signal)
Output level	0 V ±0.2 V (V_{OH})/–1 V ±0.2 V (V_{OL})
Output signal format	NRZ
Impedance	50Ω
Connector	SMA
Clock output	Retiming Clock Output
Frequency	9.95328 GHz ±50 ppm (By input signal)
Output level	1 V (p-p) ±0.2 V
Impedance	50Ω
Connector	SMA
Clock output	Monitor Clcok Output
Frequency	9.95328 GHz ±50 ppm (By input signal)
Output level	1 V (p-p) ±0.2 V
Impedance	50Ω
Connector	SMA

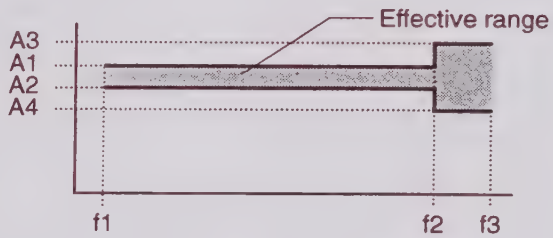
Table 1-2 Specifications (2/3)

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Intrinsic jitter</td><td>
<table>
<tr><td></td><td colspan="3">Additional Error (UIpp)</td></tr>
<tr><td></td><td>HP1+LP</td><td>HP2+LP</td><td>HP'+LP</td></tr>
<tr><td>A</td><td>0.135</td><td>0.072</td><td>0.135</td></tr>
<tr><td>B</td><td>–</td><td>–</td><td>0.027</td></tr>
</table>
* MU967701A: Wide
MP1777A: Rx 1 UI Range
A: ME3630A (With Opt.24, 34): SDH Internal Scramble ON,
Info: PRBS $2^{31}-1$
B: MP1763B: PRBS $2^{7}-1$
Measurement temperature condition: 10 to 30 °C
<table>
<tr><td></td><td colspan="2">Additional Error (UIrms)</td></tr>
<tr><td></td><td>HP+LP</td><td>HP'+LP</td></tr>
<tr><td>A</td><td>0.027</td><td>0.009</td></tr>
<tr><td>B</td><td>–</td><td>0.009</td></tr>
</table>
* MU967701A: Wide
MP1777A: Tx Jitter OFF, Rx 1 UI Range
A: ME3630A (With Opt.24, 34): SDH Internal Scramble ON,
Info: PRBS $2^{31}-1$
B: MP1763B: PRBS $2^{7}-1$
Measurement temperature condition: 10 to 30 °C
</td></tr>
<tr><td>Jitter tolerance</td><td>


<table>
<tr><td>A1</td><td>A2</td><td>A3</td></tr>
<tr><td>UIpp</td><td>UIpp</td><td>UIpp</td></tr>
<tr><td>0.2</td><td>2</td><td>2490</td></tr>
</table>
<table>
<tr><td>f6</td><td>f7</td><td>f1</td><td>f2</td><td>f3</td><td>f4</td></tr>
<tr><td>Hz</td><td>Hz</td><td>Hz</td><td>Hz</td><td>Hz</td><td>Hz</td></tr>
<tr><td>10</td><td>12.1</td><td>20 k</td><td>400 k</td><td>4 M</td><td>80 M</td></tr>
</table>
* MP9677A: Wide, Input Level –6 to –8 dBm
ME3630A (With Opt.24, 34): SDH Internal, Scramble ON, Info: PRBS $2^{31}-1$
Measurement temperature condition: 10 to 30 °C
</td></tr>
</table>

Table 1-2 Specifications (3/3)

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Jitter transfer</td><td>
<Narrow>


<table>
<tr><th>A1</th><th>A2</th><th>f1</th><th>f2</th><th>f3</th></tr>
<tr><td>(dB)</td><td>(dB)</td><td>(Hz)</td><td>(MHz)</td><td>(MHz)</td></tr>
<tr><td>0.1</td><td>–19.9</td><td>100</td><td>8</td><td>80</td></tr>
</table>
<Wide>


<table>
<tr><th>A1</th><th>A2</th><th>A3</th><th>A4</th><th>f1</th><th>f2</th><th>f3</th></tr>
<tr><td>(dB)</td><td>(dB)</td><td>(dB)</td><td>(dB)</td><td>(Hz)</td><td>(MHz)</td><td>(MHz)</td></tr>
<tr><td>1.5</td><td>–1.5</td><td>3.5</td><td>–3.5</td><td>100</td><td>10</td><td>80</td></tr>
</table>
</td></tr>
<tr><td>Dimensions, weight</td><td>150.4 (H) × 88.1 (W) × 371.6 (D) mm
Under 5 kg</td></tr>
<tr><td>Operating temperature and humidity</td><td>10 to 40°C, 40 to 90%</td></tr>
<tr><td>Storage temperature</td><td>Corresponds to the MP9677A E/O, O/E Converter.</td></tr>
</table>

Section 2 Panels Descriptions

This section explains the panels descriptions.

2.1 Panel Description 2-2

Panel Description

Fig. 2-1 shows the panel and the table below shows the description.

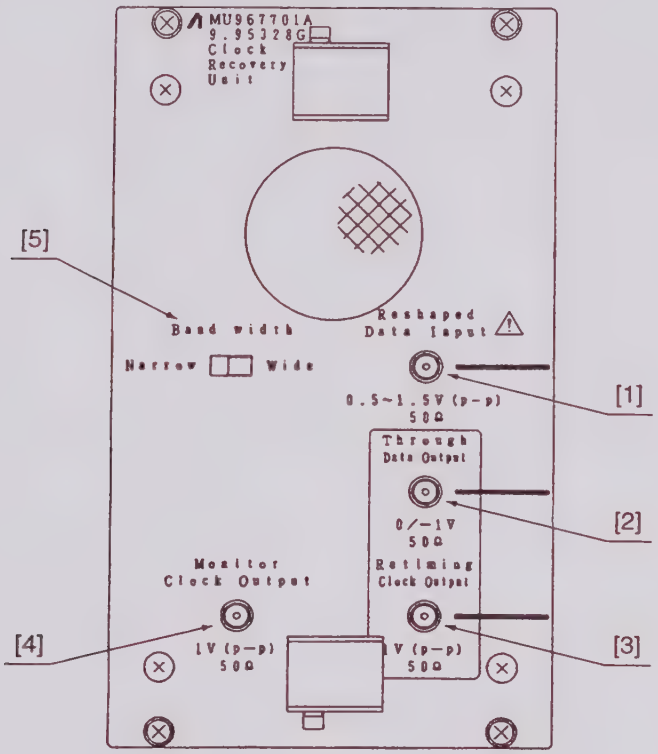


Fig. 2-1 Panel Overview

No	Name	Description
1	Reshaped Data Input	Connector for inputting 9.95328 Gbit/s data
2	Through Data Output	Connector for outputting 9.95328 Gbit/s data
3	Retiming Clock Output	Connector for outputting 9.95328 GHz clock
4	Monitor Clock Output	Connector for outputting 9.95328 GHz clock for monitoring
5	Band width	Switch for changing jitter bandwidth

Section 3 Operating Principle

This section explains the operating principle.

3.1 Operating Principle 3-2

Operating Principle

Fig. 3-1 shows the block diagram of the unit.

Reshaped Data Output data signal of MP9677A E/O, O/E Converter is inputted to Reshaped Data Input. This data signal is amplified with AMP, and one signal is outputted to Through Data Output and the other is input to Clock Recovery Module. The clock signal reproduced here is outputted to Retiming Clock Output and Monitor Clock Output.

Either Wide or Narrow jitter bandwidth can be selected for the reproduced clock signal using the Band Width switch.

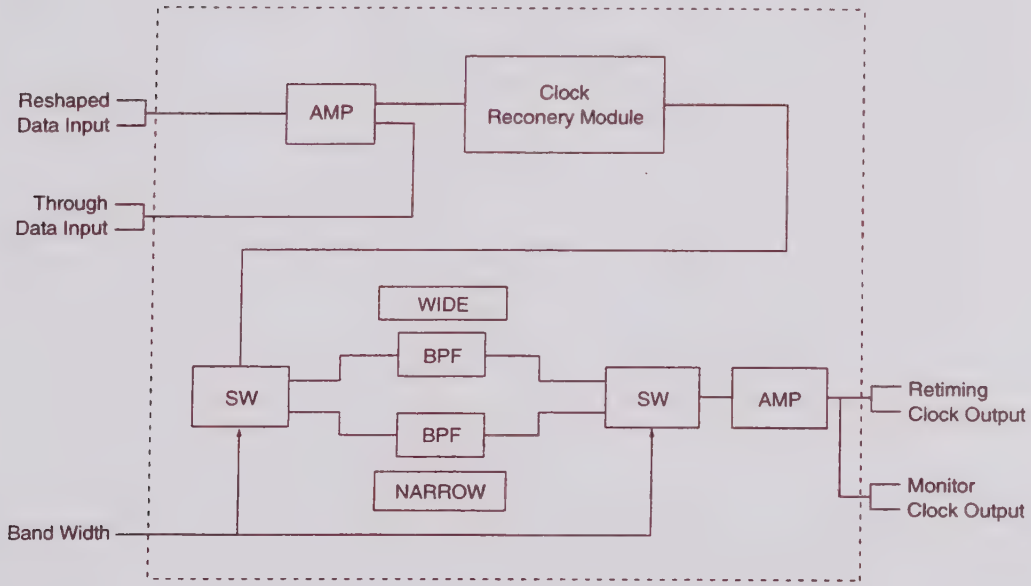


Fig. 3-1 Block Diagram

Section 4 Operation Instructions

This section explains the operation instructions.

4.1 Operation Instructions 4-2
4.1.1 Preparation 4-2
4.1.2 Operation 4-2

4.1 Operation Instructions

4.1.1 Preparation

(1) Verify that the power switch on the MP9677A E/O, O/E Converter unit is off.

(2) Check that the earth terminal of MP9677A E/O, O/E Converter unit is connected.

(3) Insert the MU967701A Clock Recovery Unit into MP9677A E/O, O/E Converter, and fix it with the specified screws as shown in Fig. 4-1.

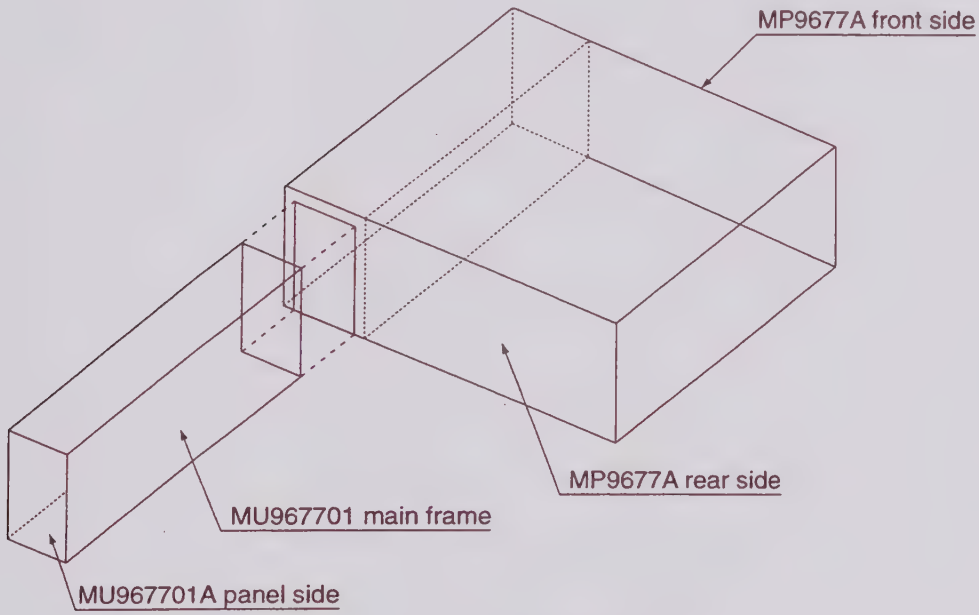


Fig. 4-1 Clock Recovery Unit Insertion

(4) Using U link cables, which are accessories of MP9677A E/O, O/E Converter, connect each input and output respectively as follows : the Reshaped Data Input of the unit and Reshaped Data Output of MP9677A unit; Through Data Output of the unit and Through Data Input of MP9677A unit; Retiming Clock Output of the unit and Retiming Clock Input of MP9677A unit.

4.1.2 Operation

Refer to MP9677A E/O, O/E Converter Operation Manual for the details of the operation.

Section 5 Performance Test

This section explains the performance test.

5.1 Outline 5-2
5.2 I/O Characteristics 5-3
5.3 Intrinsic Jitter 5-4
5.4 Jitter Tolerance 5-5
5.5 Jitter Transfer 5-6

Outline

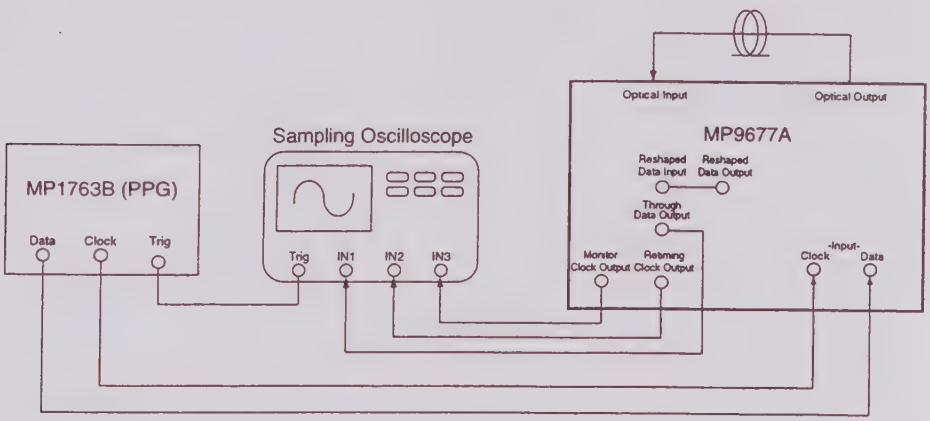
Table 5-1 shows the required specifications and recommended instruments for the test explained in this section. These instruments must be properly calibrated.

Table 5-1 Specifications for the Recommended Instruments

	Manufacturer	Recommended Instrument Name	Recommended Specification Value
Pulse Pattern Generator	Anritsu	MP1763B	Operating frequency: 0.05 to 12.5 GHz Clock data output level: 0.25 to 2 Vp-p Pseudo random pattern: 2^7–1 to 2^{31}–1
Error rate detector	Anritsu	MP1764A	Operating frequency: 0.05 to 12.5 GHz Clock data input level: 0.25 to 2 Vp-p Pseudo random pattern : 2^7–1 to 2^{31}–1 Input sensitivity: 50 mVp-p (Central value, 10 Gb/s, PRBS 2^{31}–1)
SDH/SONET Analyzer (Tx)	Anritsu	ME3630A (Tx)	Operating frequency: 9953.28 MHz Clock/Data Output: 0/–1 V, 0/–1 V, 0/–1.5 V, ECL SDH/SONET Payload: PRBS 2^7–1 to 2^{31}–1 Scramble: ON/OFF
SDH/SONET Analyzer (Rx)	Anritsu	ME3630A (Rx)	Operating frequency: 9953.28 MHz Clock input level: 0.8 to 2.0 Vp-p Data input level: 0/–1 V, 0/–1.5 V, ECL SDH/SONET Payload: PRBS 2^7–1 to 2^{31}–1 Scramble: ON/OFF
Network Analyzer	Anritsu	MS4630B With opt.10	Frequency range: 10 to 300 MHz Output attenuator (70 dB mechanical type)
10 GHz Jitter Analyzer	Anritsu	MP1777A	Bit rate: 2488.32, 4976.64, 9953.28 Mbit/s
Digital Oscilloscope	HP	54123T	20 GHz band or more

5.2 I/O Characteristics

■ Level check for Clock Output, Data Output, and Reshaped Output.



■ Procedure

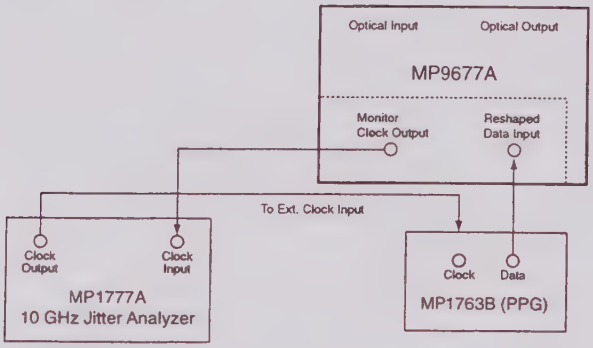
(1) At MP1763B, set the input data and input clock for MP9677A to 0/–1 V, 50Ω.

(2) Check that the output of Clock Output, Data Output, and Reshaped Data Output are within the specification ranges shown below.

Table 5-2 Output Specifications

Signal Name	Output
Retiming Clock Output	1 $V_{(p\text{-}p)}$ ±0.2 V
Monitor Clock Output	1 $V_{(p\text{-}p)}$ ±0.2 V
Through Data Output	0 V ±0.2 V (V_{OH})/–1 V ±0.2 V (V_{OL}) (Optical input at –3 dBm)

5 Intrinsic Jitter



The area enclosed within the dotted line indicates
MU967701A Clock Recovery Unit.

■ Procedure

(1) Connect as shown in the above figure except for MP9677A. Measure the intrinsic jitter of ME3630A or MP1763B.

(2) Connect as shown in the above figure and terminate Retiming Clock Output with the specified 50Ω terminating set. Then set the measurement conditions as specified below.

Table 5-3 Measurement Instrument Setting Conditions

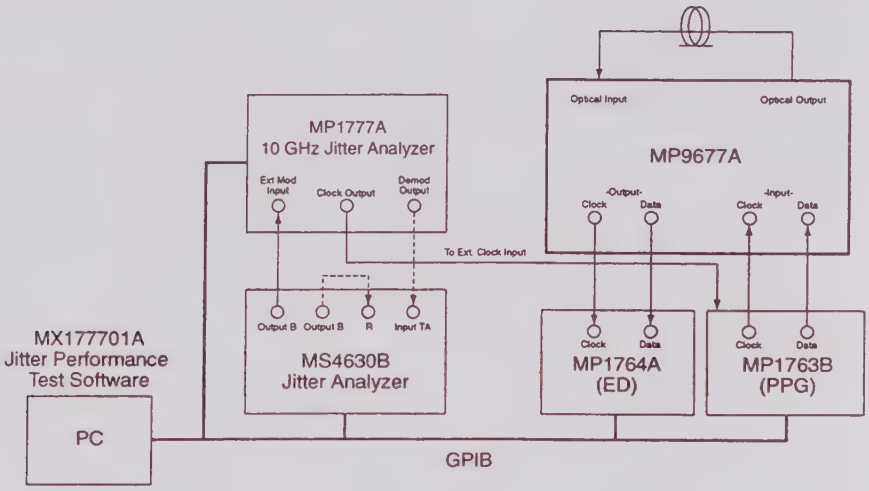
Measurement Instrument	Setting Condition
MU967701A	Wide
MP1777A	Tx Jitter OFF, Rx 1 UI Range
MP1763B	PRBS 2^7-1
ME3630A (With Opt. 24, and 34)	SDH Internal, Scramble ON Info: PRBS $2^{31}-1$

(3) Check that the intrinsic jitter is within the specified range by adjusting the Filter on the monitor of MP1777A Jitter Analyzer.

Table 5-4 Intrinsic Jitter Specification

	Additional Error (UIpp)			Additional Error (UIrms)	
	HP1+LP	HP2+LP	HP'+LP	HP1+LP	HP'+LP
ME3630A	0.135	0.072	0.135	0.027	0.009
MP1763B	–	–	0.027	–	0.009

5.4 Jitter Tolerance



■ Procedure

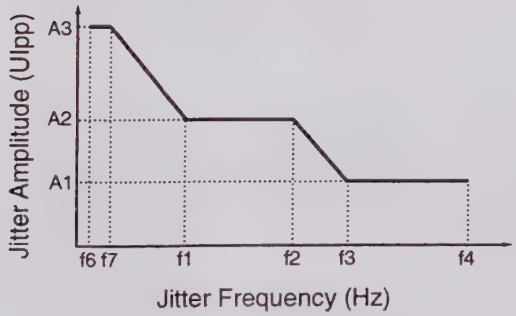
(1) Connect as shown in the figure above and then set the measurement conditions as specified below.

Measurement Instrument	Setting Conditions
MP9677A	Wide, Input Level: –6 to –8 dBm
ME3630A (With Opt.24, and 34)	SDH Internal, Scramble ON Info: PRBS 2^{31}–1

(2) Measure the jitter tolerance using MX177701A Jitter Performance Test Software on the PC. Then check that the measured value is within the specified range.

For the details, refer to MX177701A Jitter Performance Test Software Operation Manual.

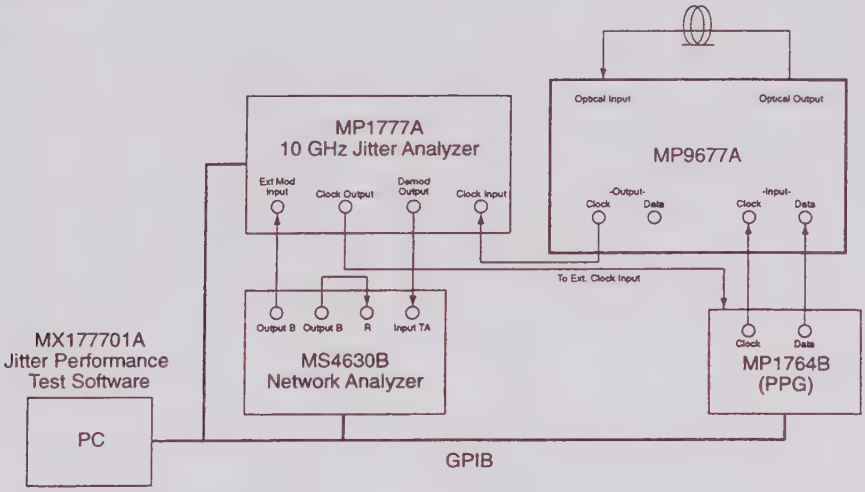
Table 5-6 Jitter Tolerance Specification Value



A1	A2	A3
UIpp	UIpp	UIpp
0.2	2	2490

f6	f7	f1	f2	f3	f4
Hz	Hz	Hz	Hz	Hz	Hz
10	12.1	20 k	400 k	4 M	80 M

Jitter Transfer



■ Procedure

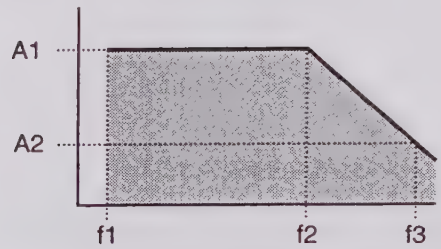
(1) Connect as shown in the figure above.

(2) Measure the jitter transfer using MX177701A Jitter Performance Test Software on the PC. Then check that the measured value is within the specified range.

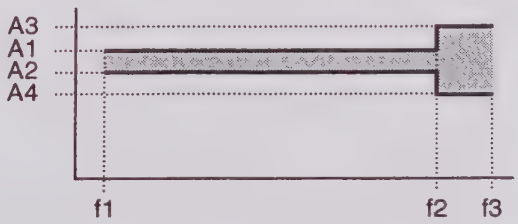
For the details, refer to MX177701A Jitter Performance Test Software Operation Manual.

Table 5-7 Jitter Transfer Specifications

<Narrow>



<Wide>



<Narrow>

A1	A2	f1	f2	f3
(dB)	(dB)	(Hz)	(MHz)	(MHz)
0.1	–19.9	100	8	80

<Wide>

A1	A2	A3	A4	f1	f2	f3
(dB)	(dB)	(dB)	(dB)	(Hz)	(MHz)	(MHz)
1.5	–1.5	3.5	–3.5	100	10	80

Section 6 Maintenance and Disposal

This section explains the maintenance and disposal.

6.1 Daily Maintenance 6-2
6.2 Cautions Regarding Storage 6-2
6.3 Transportation 6-3
6.4 Calibration 6-3
6.5 Disposal 6-3

Daily Maintenance

Make sure to turn power off and unplug the unit before cleaning it.

- Wipe the external dirt with a cloth moistened in a dilute neutral detergent.
- Remove the dust or foreign matter using a vacuum cleaner.
- Tighten the screws using the specified tool.

6.2 Cautions Regarding Storage

Consider the following points when storing the unit for an extended period:

(1) Wipe off the dust or dirt collected on the unit before storing it.

(2) Do not store the unit under the following conditions: in locations where there are high temperatures greater than 60°C or at low temperatures less than –20°C or in places of high-humidity of greater than 95%.

(3) Do not store the unit where it is exposed to direct sunlight or in a dusty place for a long time.

(4) Do not store the unit in a place where it is subject to condensation or active gas.

(5) Do not store the unit in a place where it is subject to oxidation or severe vibration.

Recommended storage conditions

When storing the unit for an extended period, the storage place should satisfy the conditions listed above and additional conditions recommended below:

(1) Temperature: 5 to 30°C

(2) Humidity: 40 to 75%

(3) A place where daily temperature/humidity fluctuations are minimum.

6.3 Transportation

When transporting the unit, pack it in the packing material used for shipping. If the materials are not available, pack it using the procedure described below. Wear clean gloves and pack carefully to prevent scratching or hits which can damage the unit.

(1) Wipe the external dirt with dry cloth.

(2) Check for loosened or missing screws.

(3) Take some measures to protect structurally projected areas, or areas which are vulnerable to deformation, and then wrap the unit in polyethylene sheets. In addition, wrap it in moisture proof sheets.

(4) Put the wrapped unit into a cardboard box and close the box with adhesive tapes.

(5) During transportation, store the unit in an environment which satisfies the conditions listed in "6.2 Cautions regarding storage".

6.4 Calibration

Only the manufacturer can calibrate the unit. Periodic calibration is recommended to guarantee the performance.

6.5 Disposal

The unit uses gallium arsenide. Dispose the unit with care by complying with applicable national laws and local regulations.

Performance Test Result Record Sheet

Product name: MU967701A Clock Recovery Unit

Manufacture No.: _____ Ambient humidity: _____ °C

Date: _____ Relative humidity: _____ %

Person in charge of the test: _____

Remarks:

_____

_____

_____

_____

1. Electrical Characteristics

Signal Name	Minimum Value for Specification Standard	Measured Value	Maximum Value for Specification Standard	Measurement Uncertainty
Through Data Output	–0.2 V (V_{OL})		0.2 V (V_{OL})	±24 mV
	–1.2 V (V_{OH})		–0.8 V (V_{OH})	
Retiming Clock Output	0.8 V (p-p)		1.2 V (p-p)	
Monitor Clock Output	0.8 V (p-p)		1.2 V (p-p)	

2. Jitter Performance

(1) Intrinsic jitter (should have the values shown in the table or more)

	Jitter Amplitude Value (UIpp)						Measurement Uncertainty
	Specification Value			Measured Value			
Instrument Type	HP1+LP	HP2+LP	HP'+LP	HP1+LP	HP2+LP	HP'+LP	
ME3630A	0.135	0.072	0.135				±10%
MP1763B	–	–	0.027	–	–		

	Jitter Effective Value (UIrms)				Measurement Uncertainty
	Specification Value		Measured Value		
Instrument Type	HP+LP	HP'+LP	HP+LP	HP'+LP	
ME3630A	0.027	0.009			±10%
MP1763B	–	0.009	–		

Jitter tolerance (should have the values shown in the table or more)

Jitter Frequency (Hz)	Jitter Amplitude Value (UIpp)		Measurement Uncertainty
	Specification Value	Measured Value	
10	2000		±10%
12.1	2000		
20 k	2		
400 k	2		
4 M	0.2		
80 M	0.2		

MP9677A: Wide, Input Level= –6 to –8 dBm

ME3630A (With Opt.24, 34): SDH Internal, Scramble ON, Info: PRBS 2^{31}–1

MP1763B: PRBS 2^{7}–1

(3) Jitter transfer

Jitter Frequency (Hz)	Gain (dB)				Measurement Uncertainty
	Narrow		Wide		
	Specification Value	Measured Value	Specification Value	Measured Value	
100	0.1		±1.5		±10%
8 M	0.1		–		
10 M	–		±3.5		
80 M	–19.9		±3.5		

Anritsu Service and Sales offices

America

Anritsu Company (ACUS)

685-A Jarvis Drive Morgan Hill, CA
95037-2809, U.S.A.
Phone: +1-408-776-8300
Fax: +1-408-776-1738

Anritsu Company (ACUS-NJ) Dist.5

10 New Maple Avenue, P.O. Box 836
Pine Brook, NJ 07058-0836, U.S.A.
Phone: +1-973-227-8999
Fax: +1-973-575-0092

Anritsu Company (ACUS-Maryland) Dist.6

19630 Club House Road, #710
Gaithersburg, MD20879, U.S.A.
Phone: +1-301-590-0300
Fax: +1-301-216-2893

Anritsu Company (ACUS-Tx) NARO

1155 East Collins Blvd
Richardson, TX 75081, U.S.A.
Phone: +1-972-644-1777
Fax: +1-972-644-3416

Anritsu Electronics Ltd (ACCA)

5A-245 Matheson Blvd. East, Mississauga,
Ontario, L4Z 3C9, Canada
Phone: +1-905-890-7799
Fax: +1-905-890-2290

Anritsu Electronics Ltd (ACCA)

102-215 Stafford Road West Nepean,
Ontario, K2H 9C1, Canada
Phone: +1-613-828-4090
Fax: +1-613-828-5400

Anritsu Electronics Ltd (ACCA)

200-1405 Trans Canada Highway
Dorval, Quebec H9P 2V9, Canada
Phone: +1-514-421-3737
Fax: +1-514-685-9839

Anritsu Electronics Ltd (ACCA-Calgary)

Deerfoot Atrium, Suite 129, 6715-8th Street
N.E., Calgary, AB, T2E 7H7, Canada
Phone: +1-403-275-9855
Fax: +1-403-275-3609

Anritsu Eletrônica Ltd (ACBR)

Praia de Botafogo, 440-Sala 2401
CEP 22250-040, Rio de Janeiro, RJ, Brasil
Phone: +55-21-5276922
Fax: +55-21-537-1456

Anritsu Eletrônica Ltd (ACBR) Sao Paulo Branch Office

Praca Amadeu Amaral 27,
Primera Andar, Conj. 11, 12, 13, 14
Liberdade, Sao Paulo, Estado de
Sao Paulo, CEP : 01327-010, Brasil
Phone: +55-11-283-2511
Fax: +55-11-288-6940

Data Lab S.R.L

Edif. Ayfra, Pdte. Franco y Ayolas
Asuncion, Paraguay
Phone: +595-21-443-046
Fax: +595-21-441+935

Electro-Impex S.A.

P.O. Box 620-1000, San Jose, Costa Rica
Phone: +506-2-31-5701
Fax: +506-2-31-6531

Electronica 2000, S.A. DE C.V.

Blvd. Adolfo Lopez Mateos No.2016, Col.
Tlacopac, Del. Lopez Mateos, 01010,
Mexico D.F.
Phone: +525-662-8800
Fax: +525-662-5862

Electronic Engineering S.A.

Carretera de Circunvalavion, Sabanilla, Av
Novena, San Jose, Costa Rica
Phone: +506-2-25-8793
Fax: +506-2-25-1286

HDM Elquitecnica Cia. Ltda., Equitronics S.A.

Av. Republica de El Salvador, No.880,
Edificio, Almirante Colon 4to piso,
Quito, Ecuador
Phone: +593-9-704890
Fax: +593-2-48-2627

KRM Ingenieria Saciafs.

Viamonte 377,7° Piso 1053 Buenos Aires,
Argentina
Phone: +54-1-311-4165
Fax: +54-1-311-2297

SI Ltda.

E. Conchy Y Toro 65, Casilla 51888,
Santiago, Chile
Phone: +56-2-696-7534
Fax: +56-2-696-9665

Radiocom S.A.

Carrera 21 No.85-71, Conmutador
6100077, Santafe de Bogota, Columbia
Phone: +57-1-218-2054
Fax: +57-1-610-3272

Radiocomunicaciones cruz C.A.

Avda La Colina QTA. Elison, URB Colina
De Los Caobos, Caracas, Venezuela
Phone: +58-2-793-2322
Fax: +58-2-793-3429

Sakata Ingenieros S.A.

Av. Canaval Moreyra 840, Lima 27, Peru
Phone: +51-1225-7555
Fax: +51-1224-8148

Suministros Industriales S.A.

Casa 102, Calle 68 Este,
San Francisco, Balboa, Panama
Phone: +507-270-2328
Fax: +507-270-2329

Cabonorte S.A.

Colonia 1900, ESC. 603,
Montevideo, Uruguay
Phone: +598-2-430522
Fax: +598-2-418594

Europe

Anritsu Ltd (ACUK)

200 Capability Green, Luton
Bedfordshire, LU1 3LU, United Kingdom
Phone: +44-1582-433200
Fax: +44-1582-731303

Anritsu Ltd (ACUK-Manchester)

Kansas Avenue, Langworthy Park Salford,
Manchester M5 2GL, United Kingdom
Phone: +44-161-873-8041
Fax: +44-161-873-8040

Anritsu Ltd (ACUK-Bristol)

1230 Aztec West, Almondsbury
Bristol BS12 4SG, United Kingdom
Phone: +44-1454-615252
Fax: +44-1454-618017

Anritsu Ltd (ACUK-Livingston)

Unit 1, Knightsridge Industrial Estate
Turnbull Way, Knightsridge Livingston
EH54 8RB, United Kingdom
Phone: +44-1506-436111
Fax: +44-1506-436112

Anritsu GmbH (ACDE)

Grafenberger Allee 54-56
D-40237 Düsseldorf 1, Germany
Phone: +49-211-96855-0
Fax: +49-211-96855-55

Anritsu GmbH (ACDE-Sales Center South)

An der Steinernen Brücke 1 D-85757
Karlsfeld, Germany
Phone: +49-8131-3825-0
Fax: +49-8131-3825-95

Anritsu S.A. (ACFR)

9, Avenue du Québec ZA de Courtaboeuf 91951 Les Ulis Cedex, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

Anritsu S.A. (ACFR) (Toulouse Office)

Bureau de Toulouse
Région Centre Sud Ouest
Phone: +33-5-62070484
Fax: +33-5-62070668

Anritsu S.A. (ACFR) (Toulon Office)

Bureau de Toulon
Région Centre Sude Est
Phone: +33-4-94040264
Fax: +33-4-94040265

Anritsu S.A. (ACFR) (Rennes Office)

Bureau de Rennes
Région Ouest
Phone: +33-2-99521214
Fax: +33-2-99521224

Anritsu S.p.A. (ACIT)

Via Elio Vittorini, 129
00144 Roma EUR, Italy
Phone: +39-06-509-9711
Fax: +39-06-502-2425

itsu S.p.A (ACIT-Milano)

C.D. Colleoni, Via Paracelso, 420041
AGRATE B.ZA(MI), Italy
Phone: +39-039-65-7021
Fax: +39-039-605-6396

Anritsu AB (ACSE)

BOTVID CENTER
145 84 STOCKHOLM, Sweden
Phone: +46-8-53470700
Fax: +46-8-53470730

Anritsu AB-Norway Branch Office (ACNO)

Leangbukta 40 1370 Asker. Norway
Phone: +47-66-901190
Fax: +47-66-901212

Anritsu AB-Finland Branch Office (ACFI)

Piispanportti 9 FIN-02240 Espoo, Finland
Phone: +358-9-435-522-0
Fax: +358-9-435-522-50

Anritsu AB-Denmark Branch Office (ACDK)

SOHOJ 11, DK-2690 KARLSLUNDE
ark
e: +45-46160330
Fax: +45-46155299

C.N. Rood B.V.

Cort van der Linddenstraat 11-13, 2288 EV Rijswijk ZH, The Netherlands
Phone: +31-70-3996360
Fax: +31-70-3905740

C.N. Rood SA/NV

Pontbeeklaan 45, 1731 Zellik, Belgium
Phone: +32-2-4668199
Fax: +32-2-4662500

ELSINCO GMBH

h.e. Strelbishte, str. Kotlenski Prohod, bl. 96/6/14, BG-1408 Sofia, Bulgaria
Phone: +359-2-58-61-31
Fax: +359-2-58-16-98

ELSINCO Praha Spol.

Novedvorska 994, CZ 142 21 Praha 4-Branik , Czecho Republic
Phone: +42-2-49-66-89
Fax: +42-2-49-54-83

ELSINCO Budapest KFT

Pannonia utca 8. IV/I.
H-1136 Budapest, Hungary
Phone: +36-1-269-18-50
Fax: +36-1-132-69-27

ELSINCO Polska Sp. Z.O.O

ul. Dziennikarska 6/1, PL 01 605 Warszawa, Poland
Phone: +48-22-39-69-79
Fax: +48-22-39-44-42

ELSINCO Bratislava Spol. s.r.o.

Kudlakova 4, SK 844 15 Bratislava, Slovakia
Phone: +42-7-784-165
Fax: +42-7-784-454

G'Amungason Co.

Skulagata 40, 101 Reykjavik, Iceland
Phone: +354-1-677887
Fax: +354-1-625045

GMP S.A.

Av. des Baumettes 19, CH-1020 Renens 1 Lausanne, Switzerland
Phone: +41-21-6348181
Fax: +41-21-6353295

Instrutek Oeriferi A/S

Christiansholmsgade DK-8700 Horsens, Denmark
Phone: +45-75-611100
Fax: +45-75-615658

Kostas Karayannis SA

58, Kapodistriou str., GR-142 35 Nea Ionia, Athens, Greece
Phone: +30-1-680-0460-4
Fax: +30-1-685-3522

Omnitecnica S.A.

Estrada Alfragide 2700 Amadora, Portugal
Phone: +351-1-471-55-17
Fax: +351-1-471-36-10

Pema Ltd.

Doromiskin, Dundalk, Co. Louth, Ireland
Phone: +353-42-72899
Fax: +353-42-72376

Unitronics S.A.

Plaza Espana 18, Torre de Madrid, Pl. 12-ofc. 9, 28019 Madrid, Spain
Phone: +34-1-5425204
Fax: +34-1-5591957

Wien CHALL GMBH

Krichbaumgasse 25, 1120 Wien, Austria
Phone: +43-1-811-55140
Fax: +43-1-811-55180

Asia, Pacific and Africa

Anritsu Private Ltd (ACSG)

6, New Industrial Rd., #06-01/02
Hoe Huat Industrial Building
Singapore 536199
Phone: 65-282-2400
Fax: 65-282-2533

Anritsu Company Ltd (ACHK)

Suite 719, 7/F., Chinachem Golden Plaza, 77 Mody Road, Tsimshatsui East, Kowloon, Hong Kong
Phone: +852-2301-4980
Fax: +852-2301-3545

Anritsu Company Incorporated (ACTW)

6F, 96, Sec. 3, Chien Kou North Rd.
Taipei, Taiwan
Phone: +886-2-2515-6050
Fax: +886-2-2509-5519

Anritsu Corporation, Ltd (ACKR) Head Office

14F Hyunjuk Bldg. 832-41, Yeoksam-dong, Kangnam-ku, Seoul, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604~5

Anritsu Proprietary Ltd (ACAU)

Unit 3, 170, Forster Rd., Mt. Waverley
Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

Anritsu Proprietary Ltd (ACAU)

Suite 304/2 Rowe Street Eastwood
NSW 2122, Australia
Phone: +61-2-9874-9044
Fax: +61-2-9874-9920

MP MASTER
MA35036